



Non-chemical weed control – Henschke Wines

Background

Henschke Wines in South Australia has vineyards in Eden Valley and in Lenswood in the Adelaide Hills. Its 13-hectare vineyard in the cool climate region of the Adelaide Hills is grown on well-drained sandy loam over medium clay interspersed with shale fragments overlying a shale bedrock. Of the 1,134 mm of average annual rainfall, 76% falls outside of the growing season. The annual rainfall is supplemented with undervine drip irrigation.

The main weeds Prue Henschke and her vineyard team deal with are prairie grass, mallow, couch, wireweed (a problem in young vineyards), salvation jane, skeleton weed, caltrop, capeweed, scotch thistle, fathen, wild geranium and wheat from imported straw mulch – the last two being minor weeds.

Henschke uses a holistic approach to manage weeds in its vineyards, based on organic and biodynamic principles.

Key non-chemical weed control practices:

- Straw mulch spread undervine
- Mowing of the mid-row and the fringe of the undervine straw mulch
- Sheep grazing in winter
- Solarisation of couch
- Biological weed control organisms
- Strategic use of organic herbicides
- Cultivation.

Key results:

- Inter-row cropping has increased soil organic carbon levels.
- Winter sheep grazing has eliminated at least one weed control pass.
- Spreading straw mulch undervine has helped to control weeds, increase water infiltration and improve soil moisture retention.
- Straw mulch combined with sheep grazing and mowing has eliminated herbicides without any negative effect on yield or quality.
- Effective control (not eradication) of couch has been achieved using solarisation.



Mid-row weed management

When Henschke first started managing its vineyards organically, the predominant mid-row weed management tool used was cultivation. Over time, the company has moved away from cultivation and it now maintains a permanent mid-row sward of perennial rye and cocksfoot grasses. Compared to cultivation, permanent swards help to retain organic matter, improve soil structure, and protect the soil from extreme heat. Note that perennial ryegrass and cocksfoot are not recommended for drip-irrigated blocks in low rainfall areas, as they provide too much competition with vines.

The mid-row swards are managed over winter by sheep grazing and through the growing season by mowing. Sheep grazing has provided very effective control of several weeds, but Prue stresses that timing is critical; getting the sheep in before the target weeds have a chance to set seed is key. Sheep grazing also requires infrastructure for fencing and drinking water and sturdy guards to protect native plants within the vineyard from damage. Henschke uses cell grazing to manage weeds and minimise soil disturbance from over-grazing. Prue finds that reducing the amount of bare ground in the vineyard helps to limit the spread of problem weeds.

Undervine weed management

In the undervine area, Henschke spreads compost at a rate of 100 m³/ha and triticale straw mulch on top of the compost at a rate of 50 bales/ha every three years (Figure 1). The straw helps to retain soil moisture and inhibit weed growth while the compost is applied as a source of nitrogen and organic matter. Henschke has found that the straw provides excellent control of most weeds undervine. However, it does stimulate a fringe of weed growth along the straw edge.



Compared to cultivation, permanent swards help to retain organic matter, improve soil structure, and protect the soil from extreme heat.



Henschke reduces the amount of bare ground on the vineyard to limit the spread of problem weeds



Figure 1. Undervine straw mulch (image courtesy of Handpicked wines)



Controlling the weeds along the straw edge requires strategic sheep grazing, mowing, undervine whipper snipping or applications of Slasher® (an organic herbicide). Henschke focuses on managing weeds before they flower and set seed. This tactic reduces the build-up of viable weed seeds and over time, reduces the abundance of problem weeds.

Important things to consider when using straw to manage weeds are transport costs and the chemicals used on-farm to produce the straw. Chemicals applied to the straw to manage pests and diseases (e.g. Lontrel) can have a negative impact on vine growth. Checking spray diaries before purchasing straw is important to avoid damage to vines. Sourcing straw from a local supplier significantly reduces the cost of straw.

In frost-prone areas, straw can increase the risk of frost damage by slowing the flow of air across the vineyard. In these areas, Henschke uses Jeffries Dura Mulch spread undervine every three years at a rate of 100 m³/ha instead of straw.

Managing challenging weeds

Prairie grass (*Bromus catharticus* syn. *Bromus wildenowii*)

Prairie grass, a tufty, resilient, summer-active plant that can grow up to 1 m tall and aggressively competes with other plants for water and nutrients, is a prolific seed-bearer, producing an average of 1,000 seeds/m². It is spread by seed, so it is important to prevent seed set and control this weed early in the season. Henschke finds prairie grass along the edge of the straw throughout its vineyards, principally on clay loam. Sheep grazing in autumn is used to eat back the old growth along the straw edge and then Slasher® is applied along the straw edge before seeds set. A tractor-mounted whipper snipper is used throughout the season to manage prairie grass growth.



Figure 2. Prairie grass (image courtesy of HerbiGuide)

Mallow (*Malva parviflora*)

Mallow, an annual or perennial that can grow up to 1.5 m tall, is another weed spread by seed. Seeds can remain viable in the soil for up to 100 years. Henschke also finds mallow along the edge of its straw mulch. Grazing sheep in autumn controls the weed effectively - sheep love it! Henschke has also had success using rust fungus (*Puccinia myrsiphylli*) as a biological control agent to reduce the vigour and abundance of mallow in some areas.

Couch

Couch, a summer active, tough, mat-forming perennial grass with runners and rhizomes (underground stems) competes heavily with vines for water and nutrients. Henschke finds this



problem weed mainly in sandy loam soils. It is a difficult to control weed and is stimulated by the mulching and composting practices Henschke employs. Henschke has had great success using clear plastic covers to control couch hot spots through solarisation. Clear plastic covers are left down for at least two years, kept in place with pegs and bricks. Tractor access can be an issue, especially in narrow rows.

Wireweed

Wireweed, a hairless, ground-hugging, annual or perennial herb is an aggressive, fast growing annual that is spread by seed. Henschke has issues with this weed in young vineyards. To gain control, mowing or grazing is conducted early after vintage to control the weed before flowering to seed set. Success has also been achieved with double cultivation – a practice where the ground is cultivated early in the season before the wireweed has germinated. The wireweed is then allowed to germinate before the ground is cultivated again. This technique is also known as an ‘autumn tickle’.

Autumn tickling stimulates weed seed germination by placing seed in a better physical position in the soil. A well-timed autumn tickle will promote earlier and more uniform germination of some weed species for subsequent control. This tactic is best suited to weeds that are easily released from dormancy and germinate readily in the top layer of soil and in response to changing light exposure.

Salvation Jane

Salvation Jane, also known as Paterson's Curse, is an erect annual or a short-lived perennial plant 10-150 cm tall that often establishes after overgrazing, cultivation or other disturbance and then prevents other more desirable species establishing. Henschke finds Salvation Jane in bare areas with no grass. Sheep grazing is used to manage it successfully, and good control has also been seen from crown and root weevils, which are effective biological control agents.

Skeleton weed

Skeleton weed is a perennial weed with a long thin taproot up to 3m deep. It is a perennial or biennial rhizomatous herb that is spread by seed, root stocks and root fragments. Henschke finds it in hot spots, generally coming up through the straw mulch. Henschke considers it a noxious weed but recognises that it may have some benefits from drawing up nutrients due to its huge root system. Henschke has tried to control it with mowing but



Figure 3. Skeleton weed (image courtesy of HerbiGuide)



has found that the only effective way to control it is to dig it out by hand.

Caltrop

Caltrop, a low lying, hairy annual herb, germinates from spring to autumn after rain and grows rapidly producing deep roots. It grows mainly in the warmer months, growing profusely after summer rains. It usually dies in autumn or winter after the first frosts. Henschke mostly finds it on isolated patches of bare ground on the headlands, where it is spread by the movement of tractors and vehicles (coming in on the tyres of straw or compost delivery trucks). The only method to get rid of it is to hand dig after a rain when it has germinated, to get rid of seed. Rubber mats are used to pick up the seeds. Henschke finds very little caltrop where native grasses are grown as it hates competition. Summer dormant Kasbah (*Dactylis glomerata*) is also effective against caltrop.

Thistles

Scotch thistle is a large prickly, woolly, annual or biennial thistle that has a stout taproot and can germinate at any time. It is spread by seed and can produce more than 20,000 seeds per plant. Buried seeds have a long life in the soil and germinate when returned to the surface. Henschke mainly finds it in the undervine area in the Adelaide Hills. Efforts have been made to manage it through mowing but because the plant re-shoots from the base, it difficult to control. Manual removal of isolated plants, including the taproot helps to eradicate the weed. Competition through the establishment of Demeter Fescue or Phalaris is effective.

Capeweed

Capeweed is an autumn/winter germinating, annual herb with broad leaves that grows rapidly in warm temperatures, flowers in late winter/spring and dies off with onset of summer. Henschke has found that capeweed becomes an issue after fire in areas of bare soil. It is a highly competitive weed because the blanketing nature of its huge rosette stops germination of other seeds. Henschke has had success controlling capeweed using early sheep grazing, after leaf fall. Pre-pruning grazing can result in some damage to canes, but the weed management result is much better.



Figure 4. Capeweed (image courtesy of HerbiGuide)

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